THE URINARY SYSTEM PATHOLOGY

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Tumors of the renal pelvis & kidney

- **Benign tumors of the renal pelvis:**
  - Hemangioma
  - Leiomyoma
- **Malignant tumors:**
  - Transitional cell carcinoma
  - Squamous cell carcinoma.

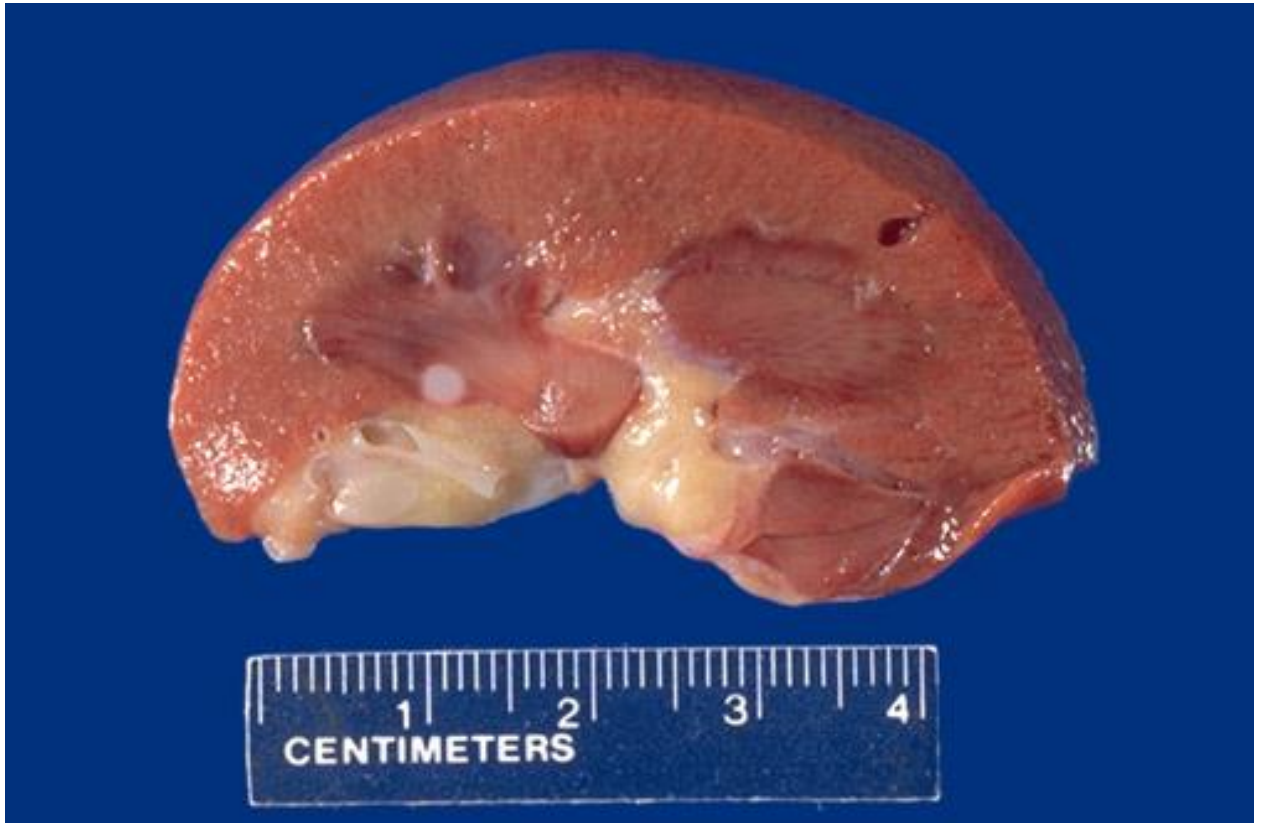
- **Benign tumors of the kidney:**
  - Fibroma
  - Cortical adenoma
  - Oncocytoma
  - Angiomyolipoma
  - Juxta-glomerular cell tumor
- **Malignant tumors:**
  - Renal cell carcinoma
  - Sarcoma
  - Metastasis
  - Wilm’s tumor
  - Lymphoma and leukemia

Benign tumors of the kidney

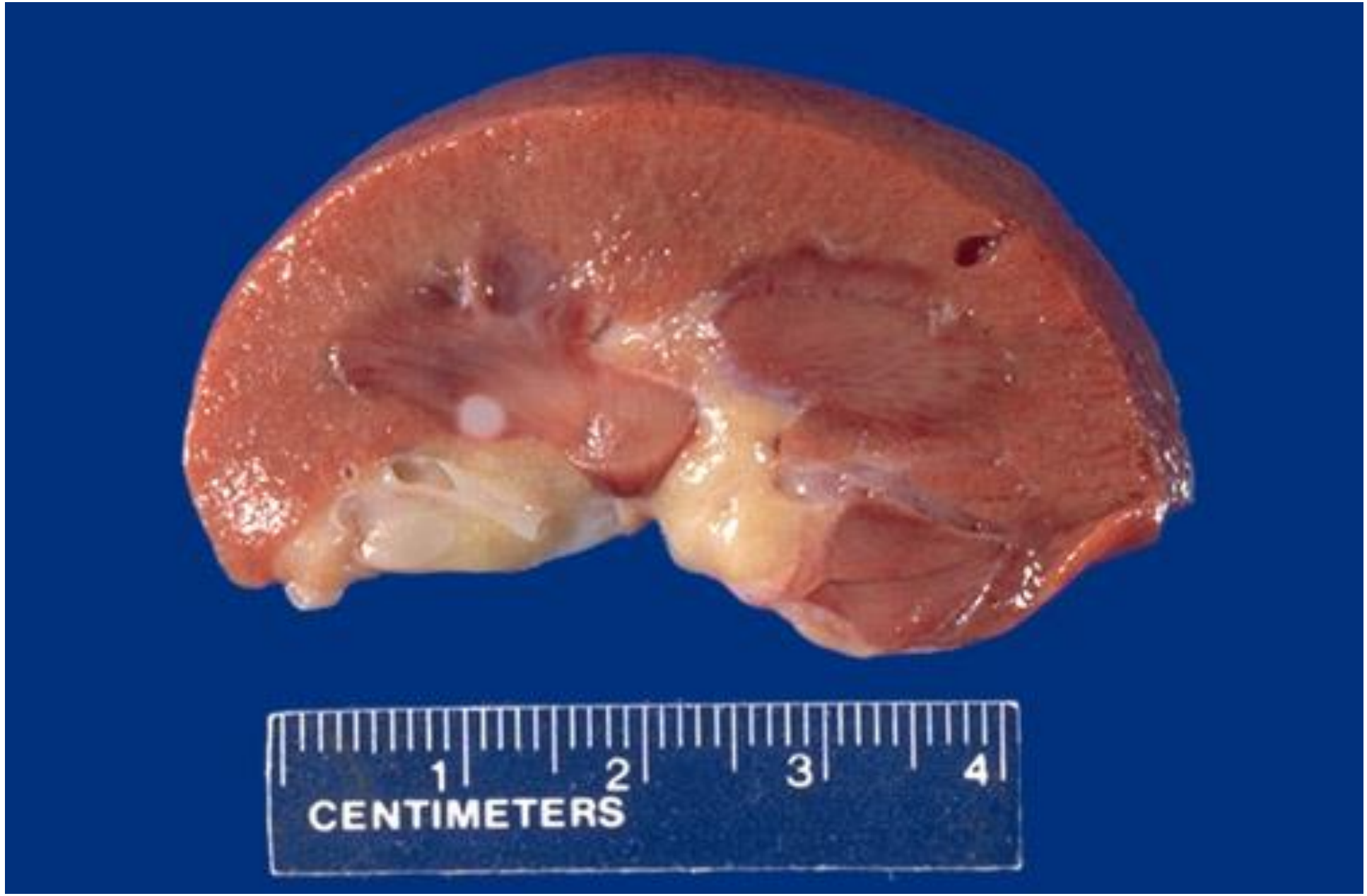
- **Fibroma of the medulla:**
  - Benign intra renal tumor
  - Small localized mass
  - Few millimeters in diameter
  - Derived from interstitial cells
- **Cortical adenoma:**
  - Usually develop in the cortex
  - Well circumscribed rounded yellowish cortical nodule, about 0.5 cm in diameter
  - It may undergo malignant transformation

- **Oncocytoma:**
  - Derived from proximal tubular cells
  - It consist of epithelial cells with eosinophilic cytoplasm (oncocytes)
  - It may reach large size
- **Angiomylipoma:**
  - A hamartoma, may be large and resemble renal cell carcinoma grossly
  - It consists of a mixture of fatty tissue, smooth muscle cells and abnormal blood vessels
- **Juxta-glomerular cell tumor:**
  - A rennin secreting tumor causing hypertension

renomedullary interstitial cell tumor (medullary)fibroma



This small round white nodule in the medulla is an incidental autopsy finding known as a medullary fibroma, also called a renomedullary interstitial cell tumor, a designation larger in size than its importance. They are generally 0.5 cm in size or less and are not associated with any renal diseases.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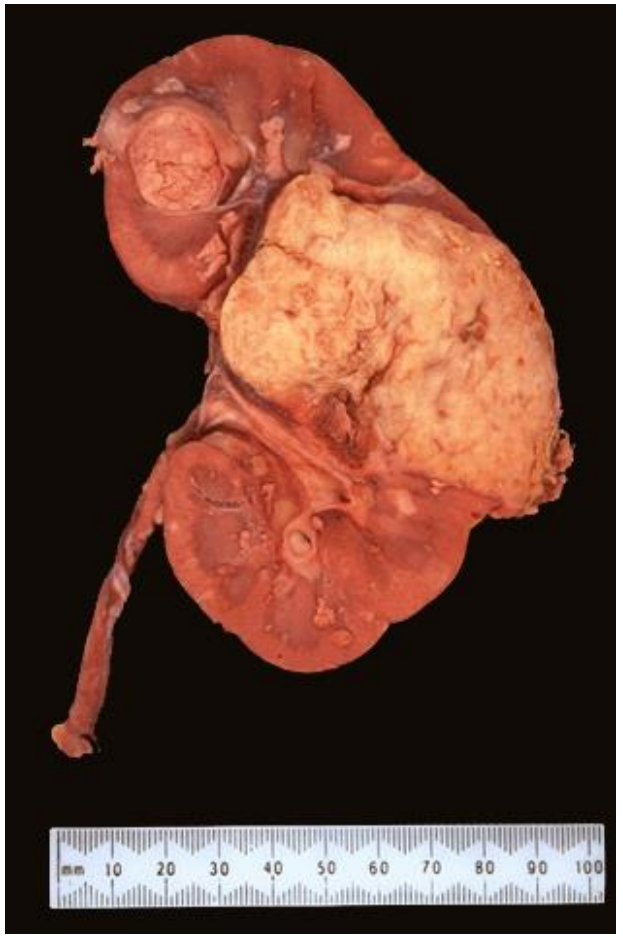
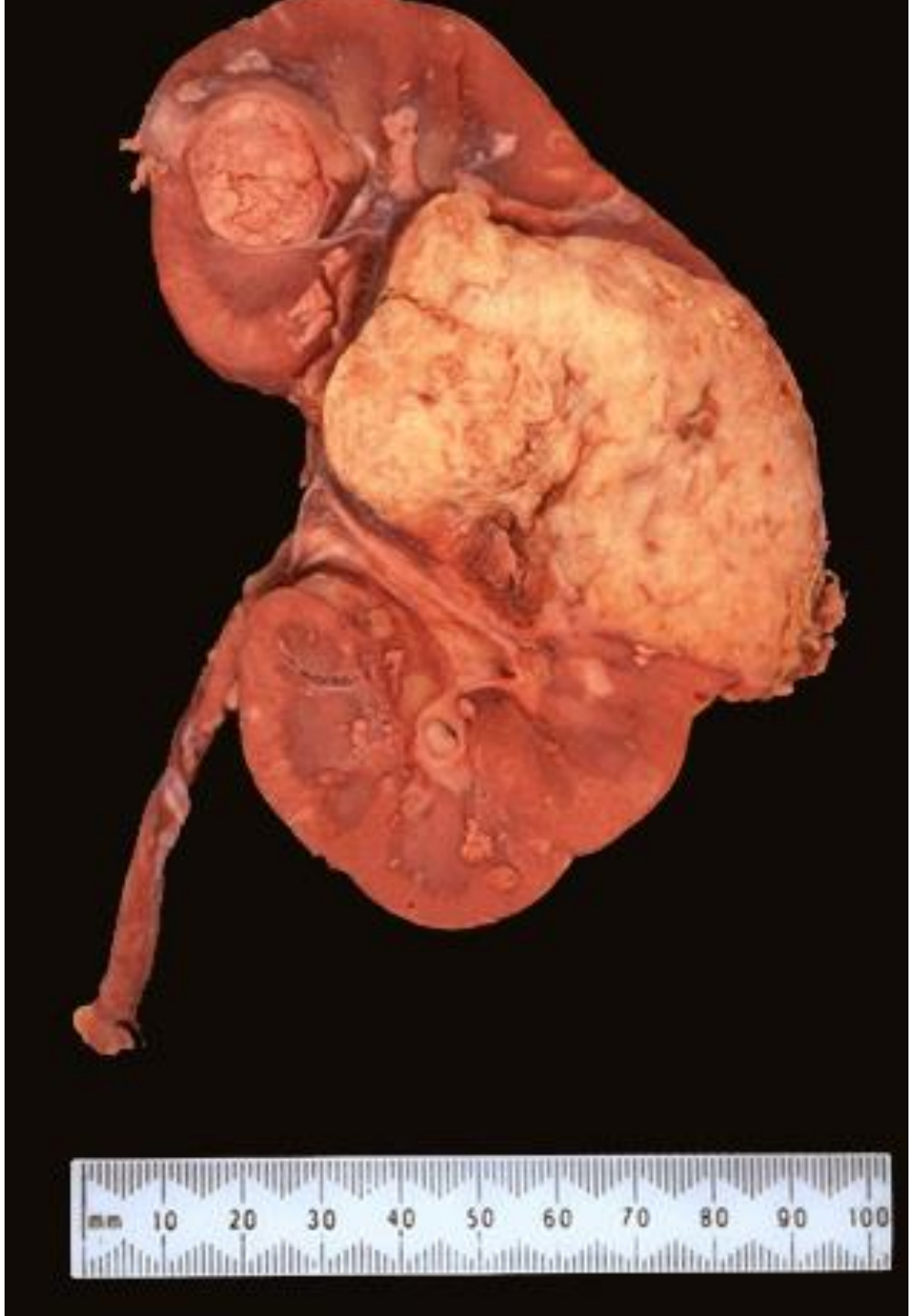
angiomyolipoma



This rare neoplasm of the kidney is called angiomyolipoma. Note that it is solid and has a tan to yellowish-tan cut surface. It is also multifocal (a smaller nodule appears in the upper pole. Most of these tumors are incidental findings, but persons with a rare condition known as tuberous sclerosis often have these tumors.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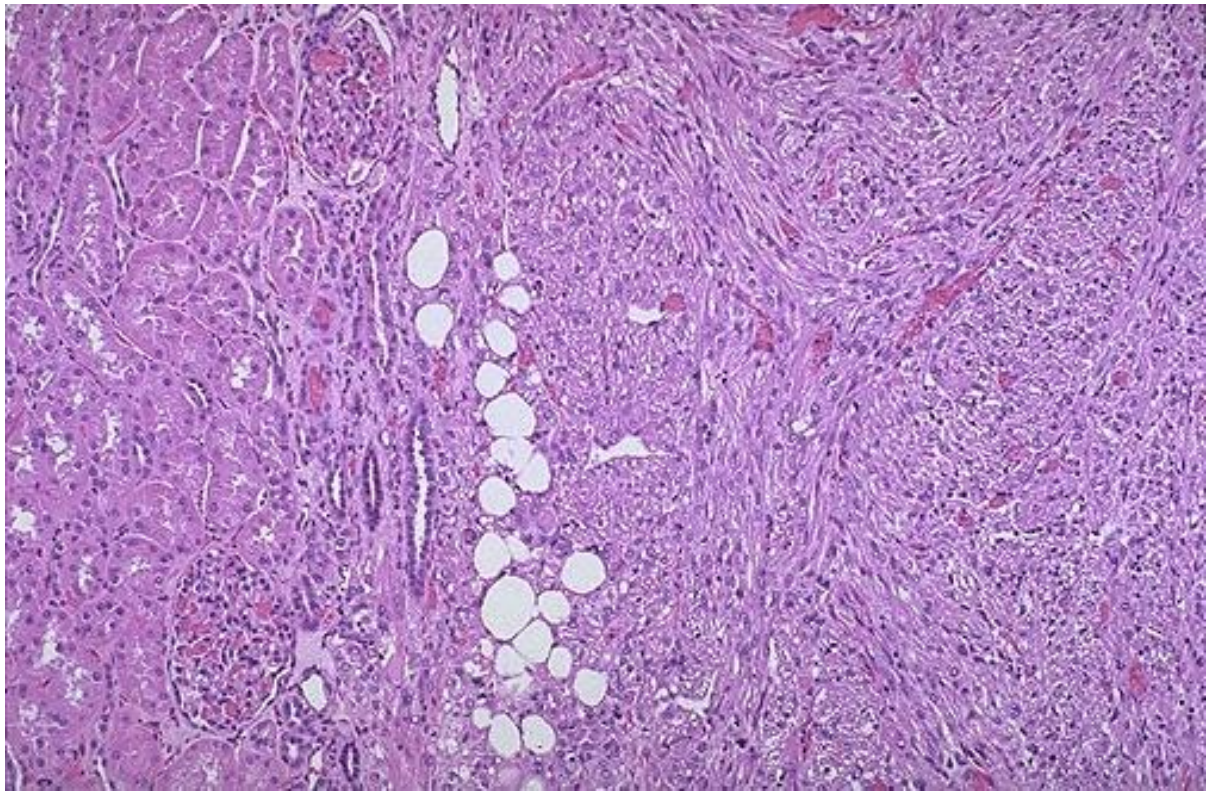
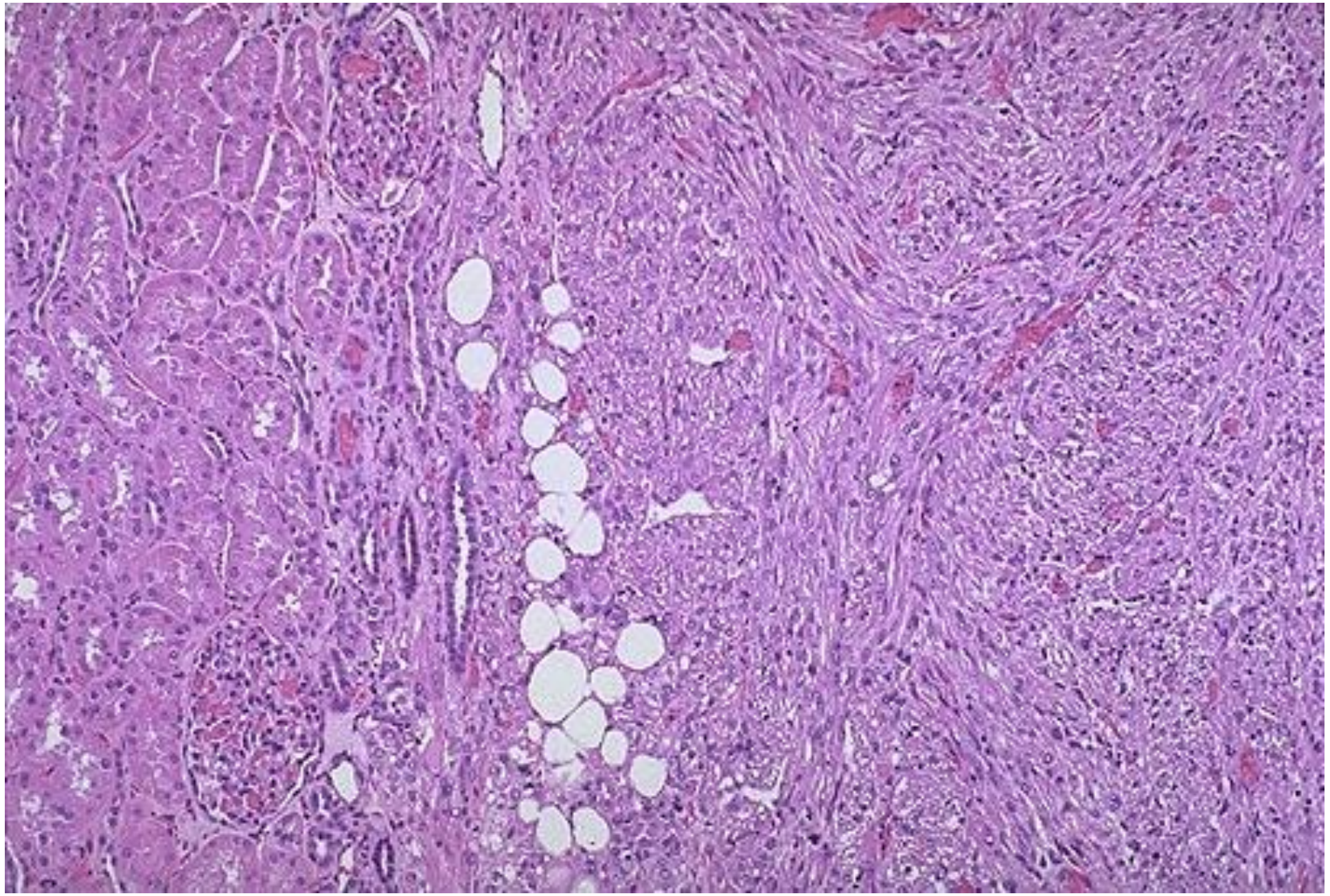
angiomylolipoma



This is the low power microscopic appearance of an angiomylolipoma. There is normal renal parenchyma at the left. The tumor has a strip of adipose tissue (the "lipoma" part) that then blends in with interlacing bundles of smooth muscle (the "myo" component) in which are scattered vascular spaces (the "angio" component).

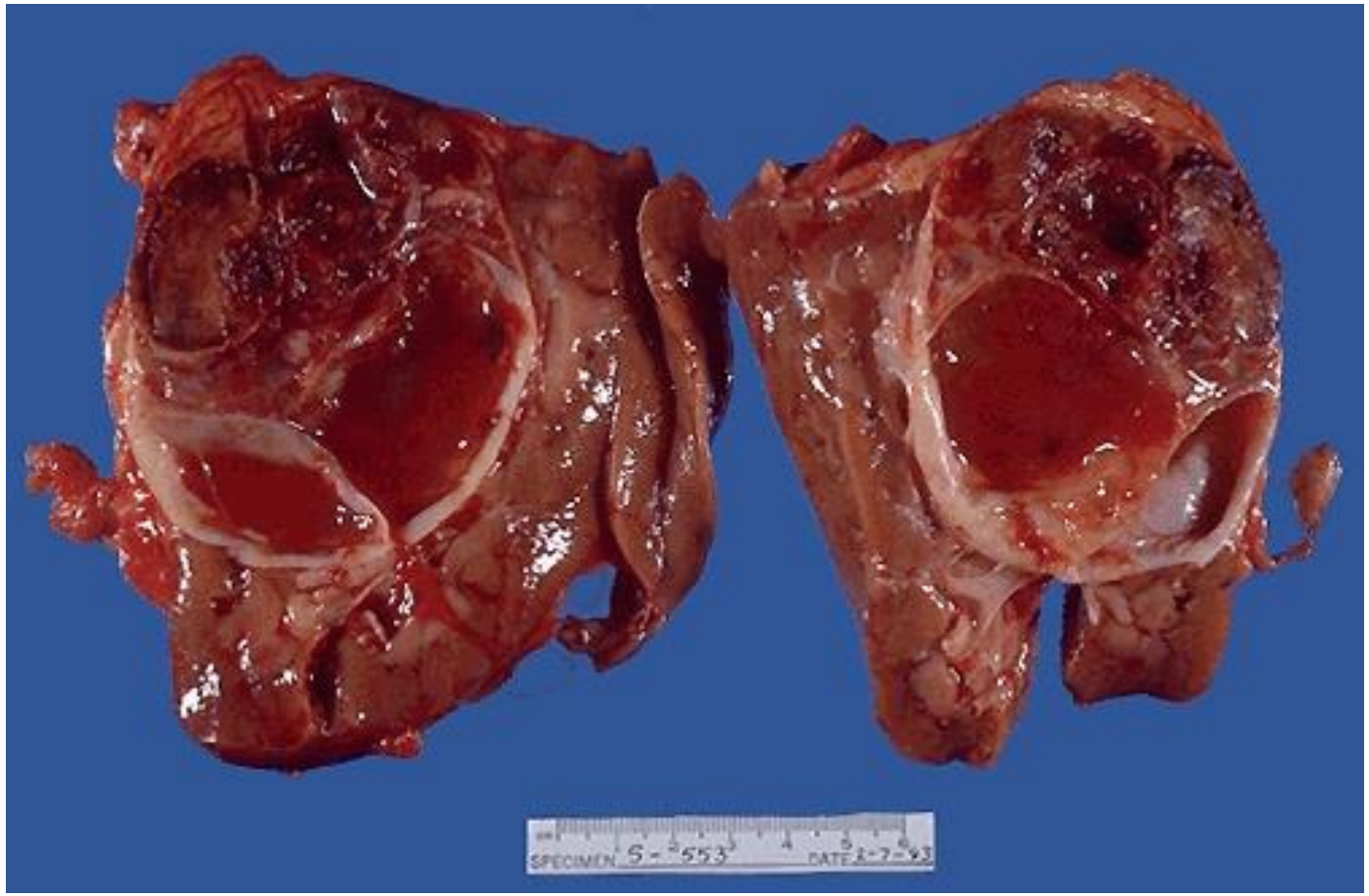


Renal cell carcinoma (hypernephroma)

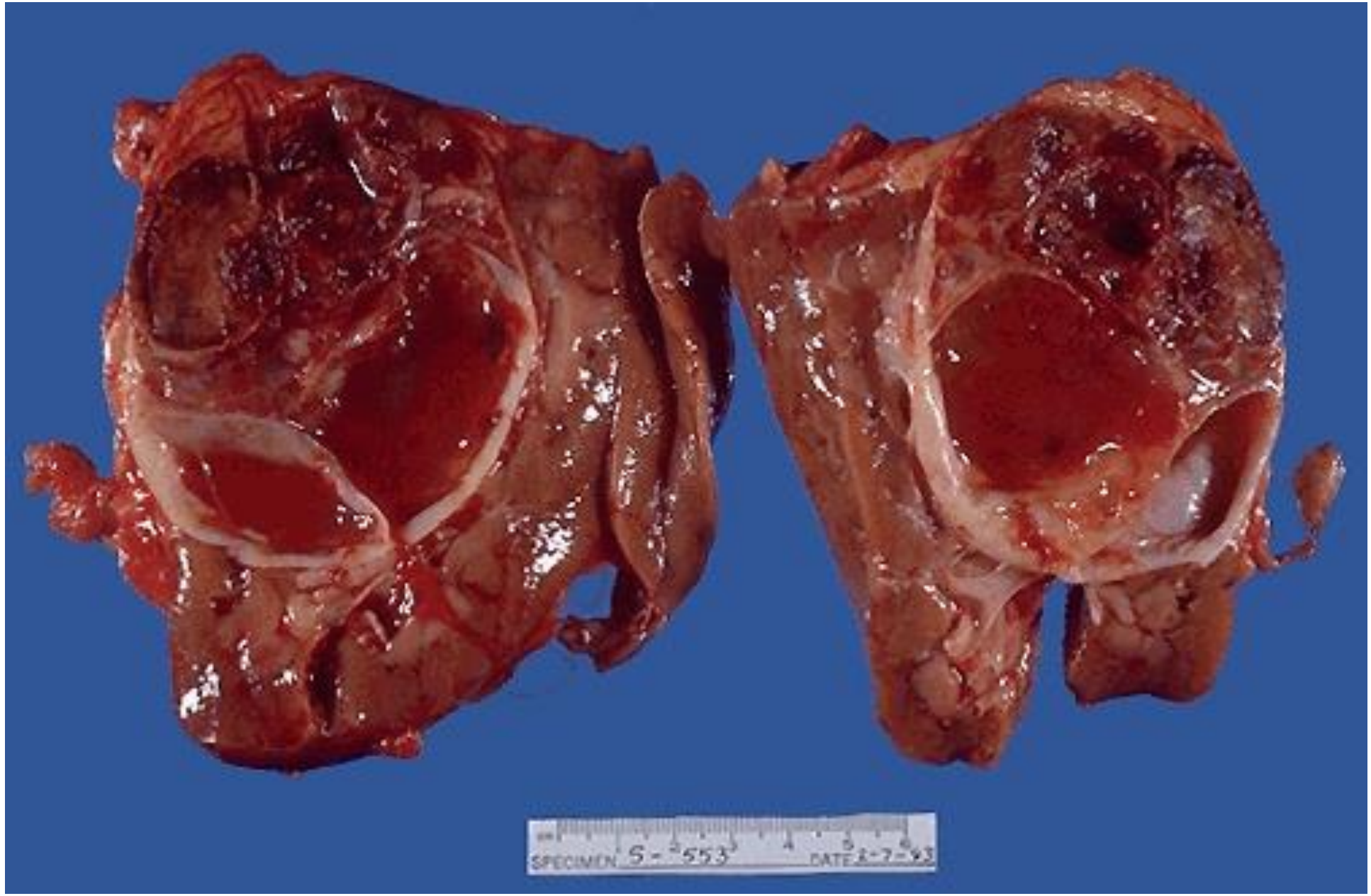
- **Incidence:**
  - 3% of adult malignancies
- **Age:**
  - Most common at the age 50-60 years
- **Aetiology:**
  - Tobacco is the most important risk factor
  - Represents 80 – 90% of all malignant tumors of the kidney
  - Men are affected twice as often as women
  - May be associated with Von Hippel Lindeu syndrome (VHL) and Tuberous sclerosis.

- **Morphology:**
  - Arises in upper or lower pole
  - Large sized mass
  - Non capsulated
- **Cut section:**
  - Bright yellow, whitish or brownish with areas of hemorrhage and necrosis (variegated appearance)
  - Tumor may bulge into the calyces and pelvis and invade the renal vein and grow as a solid column of cells within the vessel.

Renal cell carcinoma



Here is a renal cell carcinoma that on sectioning is mainly cystic with extensive hemorrhage. Sometimes large simple renal cysts may develop hemorrhage and mimic this appearance.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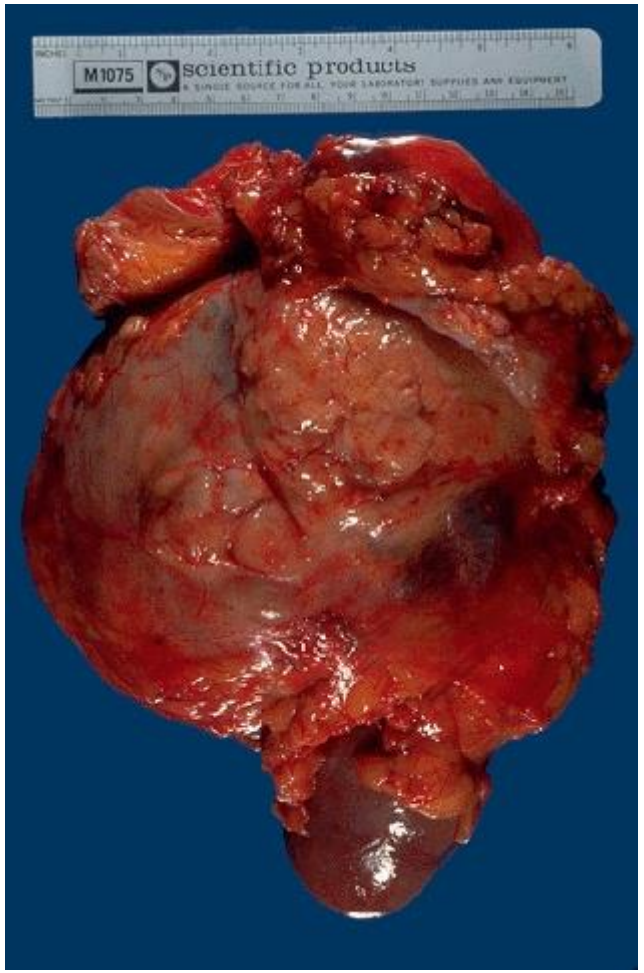
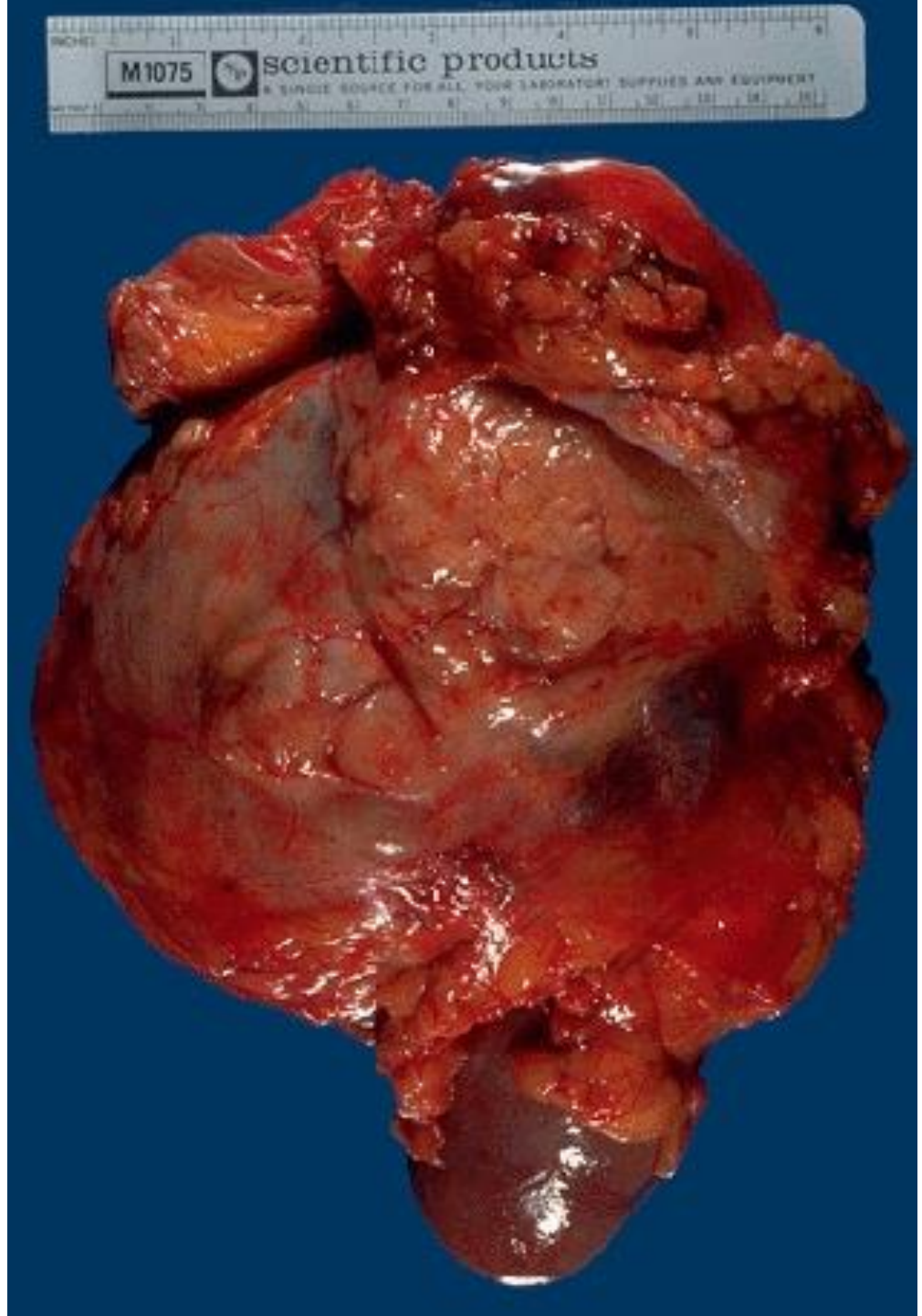
Renal cell carcinoma



This renal cell carcinoma is very large, as indicated by the 15 cm ruler. A portion of normal kidney protrudes at the lower center. This patient was a physician himself and just didn't have any early symptoms.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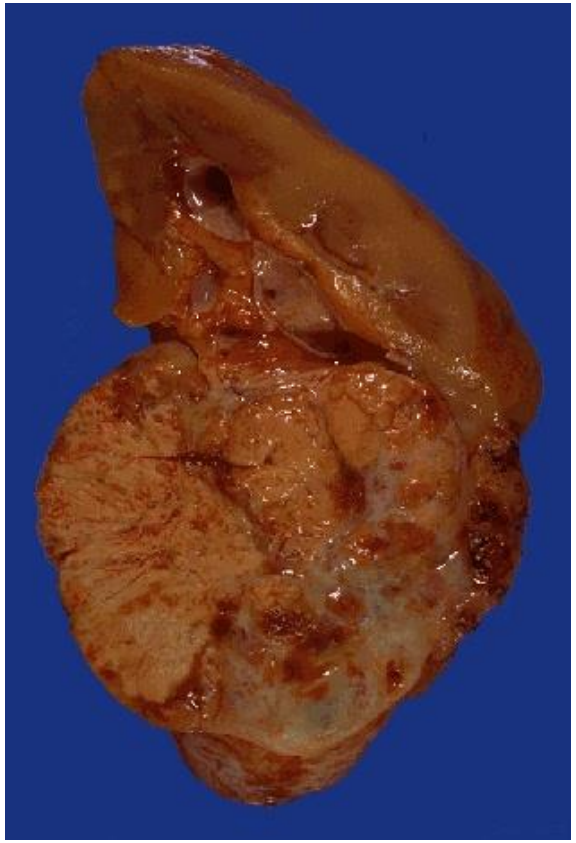
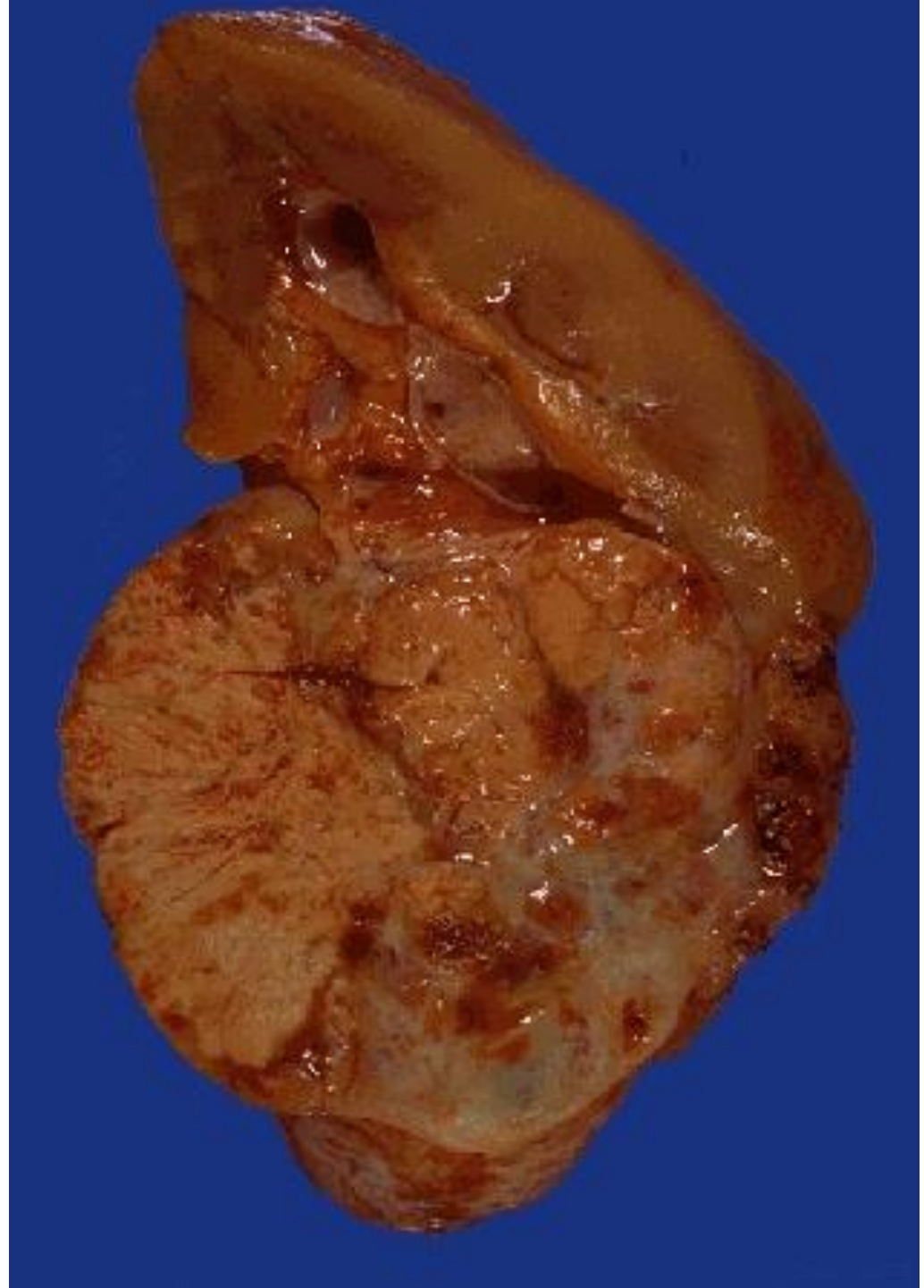
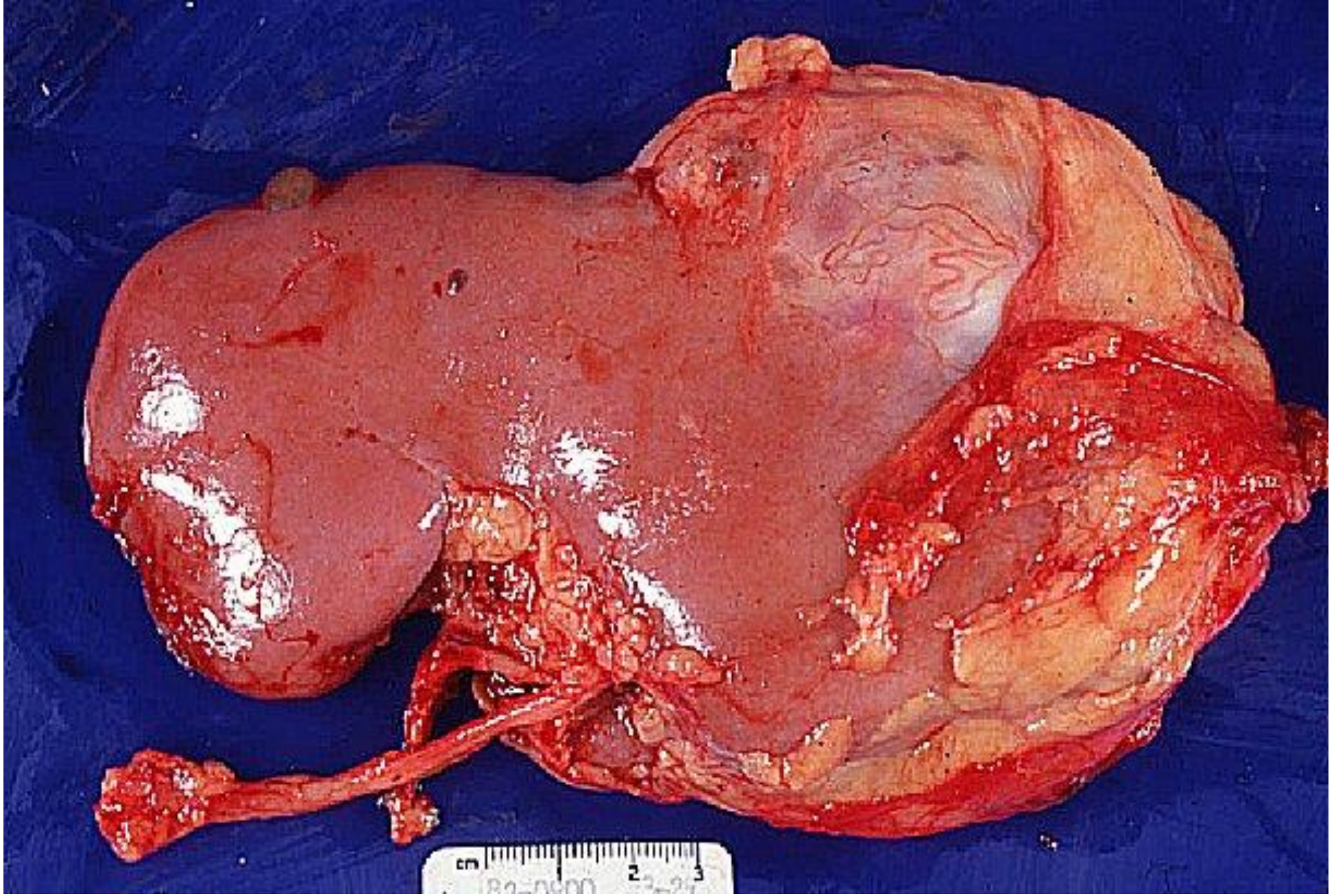
Renal cell carcinoma

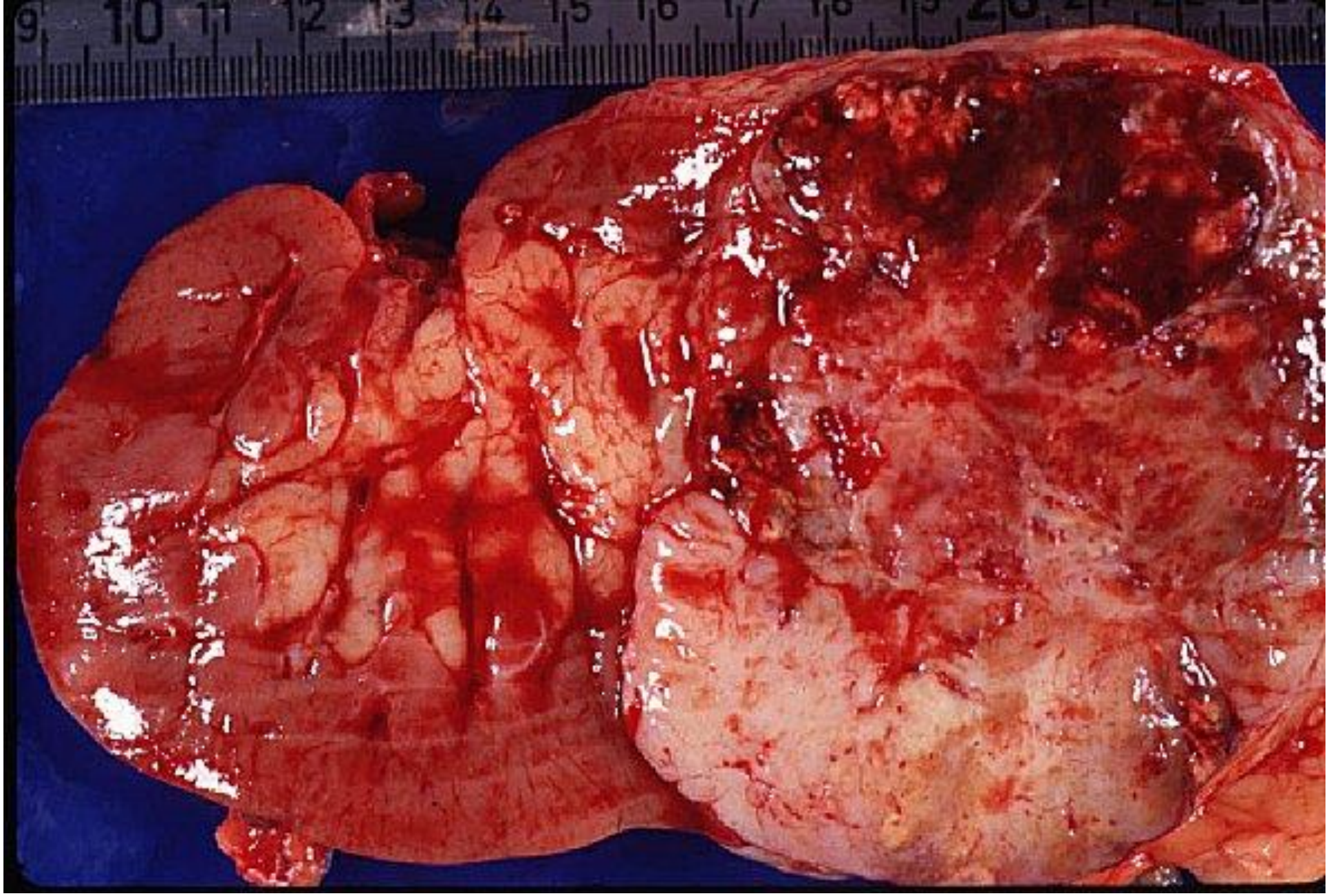


This is a renal cell carcinoma arising in the lower pole of the kidney. It is fairly circumscribed. The cut surface demonstrates a variegated appearance with yellowish areas, white areas, brown areas, and hemorrhagic red areas. Though these neoplasms are usually slow-growing, they can often reach a considerable size before detection because there is a lot of room to enlarge in the retroperitoneum, and there is another kidney to provide renal function. Thus, presenting symptoms and signs usually include flank pain, mass effect, and hematuria.

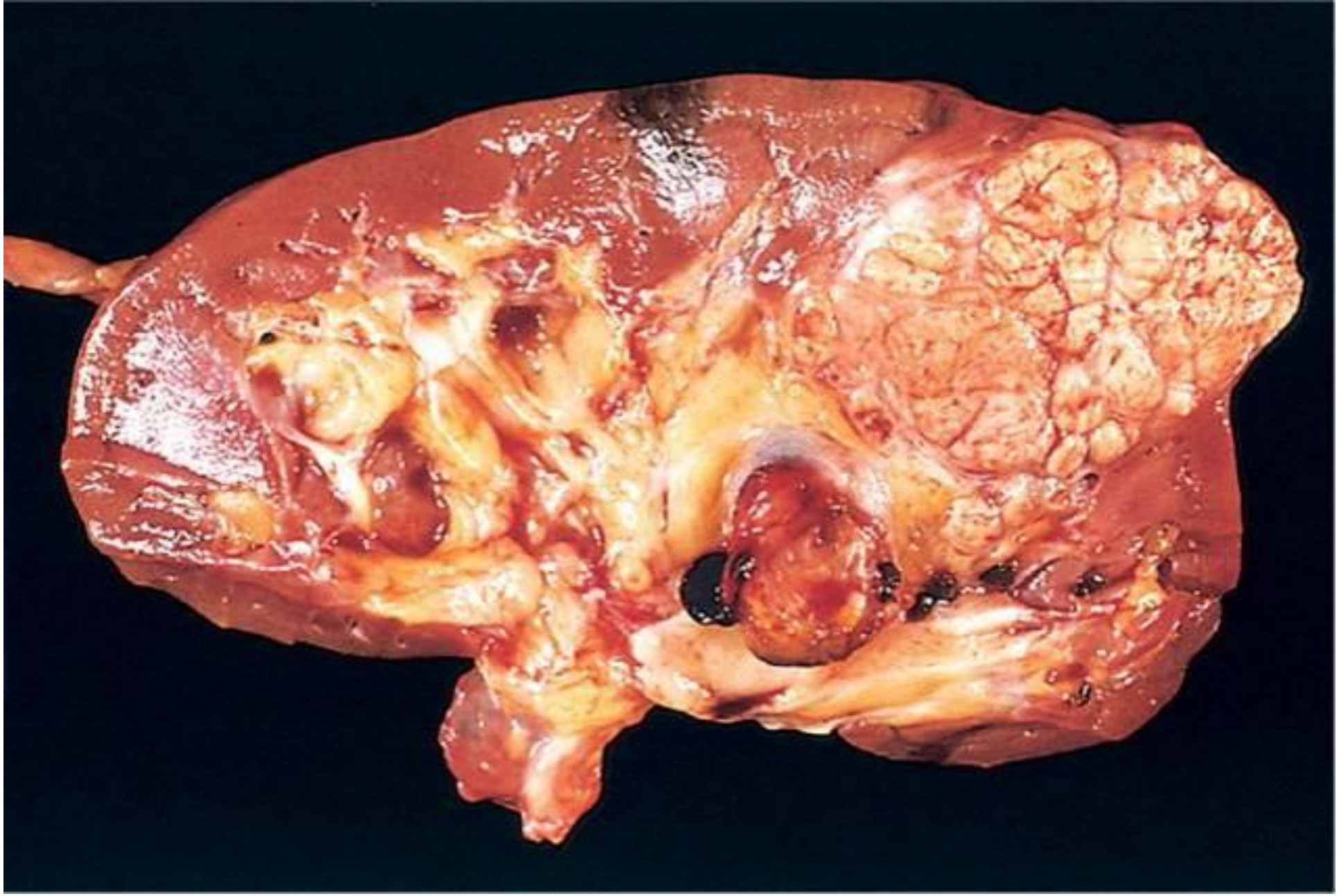




Renal cell carcinoma



Renal cell carcinoma

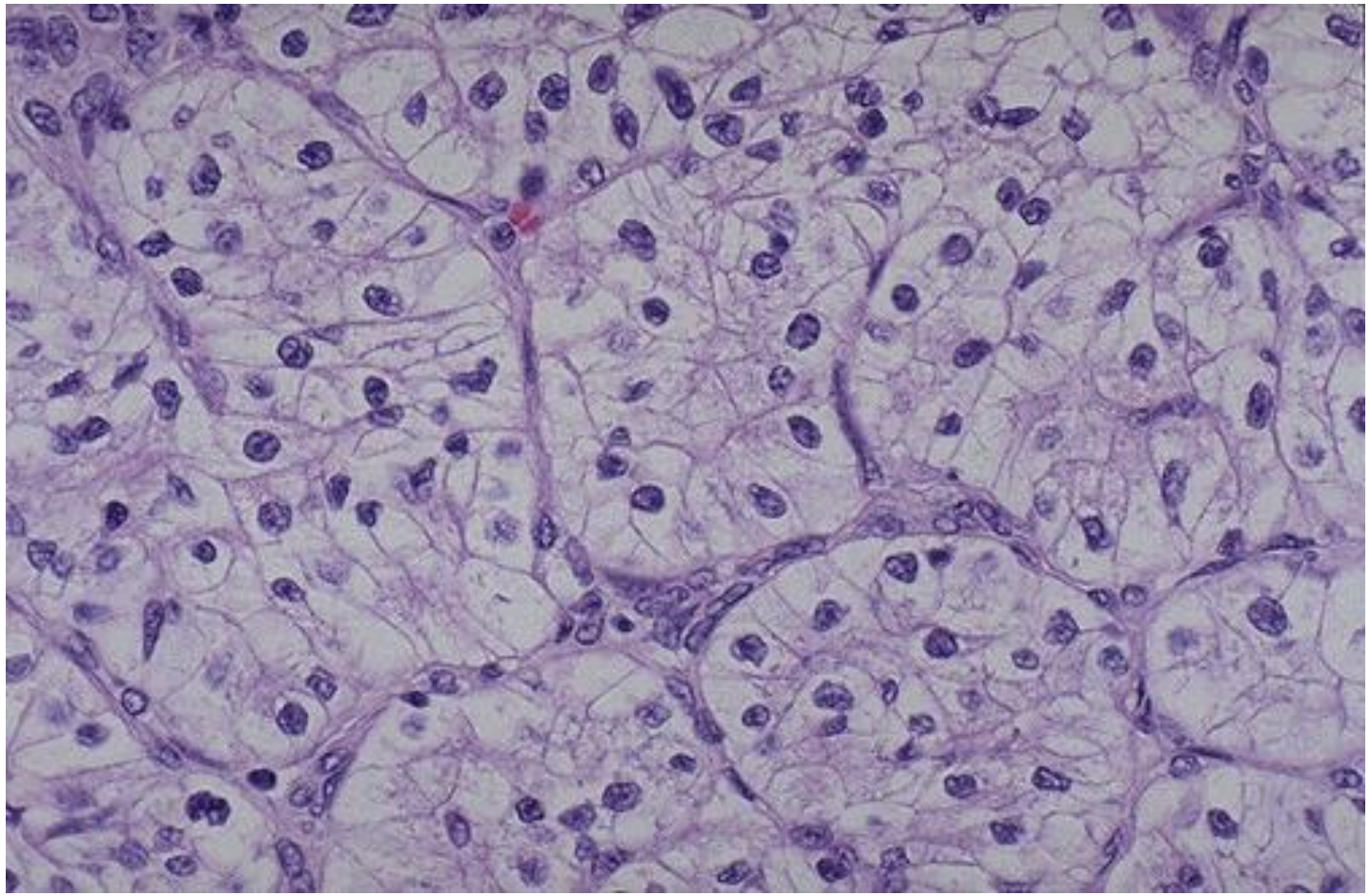


Renal cell carcinoma

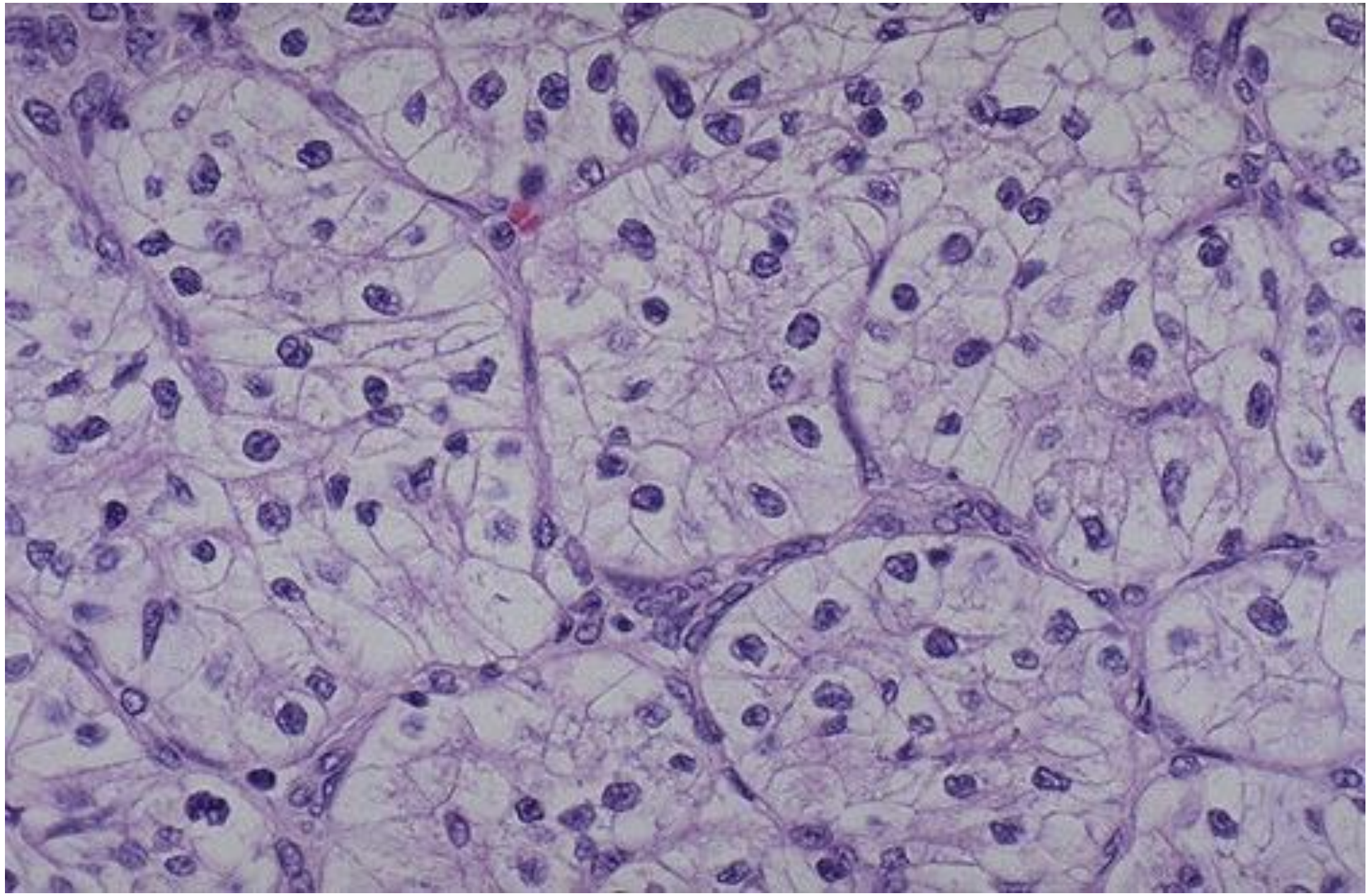
- **<u>Microscopic: it is an adenocarcinoma arising from tubular epithelial cells</u>**
- **Clear cell type 70 – 80 %:**
  - Cells have clear or granular cytoplasm and are arranged in tubules, trabeculae, acini separated by delicate strands of fibrous tissue stroma which composed of thin walled blood vessels, with area of necrosis and hemorrhage.
  - The clear cytoplasm of the cells is due to presence of cholesterol and glycogen which explain the yellowish colour on cross section.
  - The thin vessels explain the liability to haemorrhage and early spread by the blood steam.

- **Papillary carcinoma 10-15%:**
  - Papillary covered with a single layer of cuboidal to low columnar cells.
- **Chromphobe carcinoma 5%:**
  - Cells with prominent cell membranes, pale eosinophilic cytoplasm and perinuclear halo.
- **Sarcomatoid carcinoma:**
  - Rare and consists of whorled bundles of malignant spindle cells.
- **Collecting duct carcinoma:**
  - Consisting of mixture of dilated tubules and papillae.

Renal cell carcinoma



This is the classic histologic appearance of a renal cell carcinoma: the neoplastic cells have clear cytoplasm and are arranged in nests with intervening blood vessels. This microscopic appearance is why they are often called "clear cell carcinomas".



- **<u>Spread:</u>**
- **Direct spread:**
  - Renal pelvis
  - Renal vein
  - Perinephric fat and surrounding tissues
- **Lymphatic spread → to para-aortic lymph node**
- **Blood spread:**
  - Lungs (cannon ball metastasis)
  - Bones
  - Brain
  - Liver

- **<u>Clinical course:</u>**
- Painless hematuria
- Loin pain
- Palpable loin mass
- Left sided varicocele in left sided hypernephroma
- Polycythemia:
  - Affects 5 – 10% of patients
  - Results from elaboration of erythropoietin by the renal tumor.

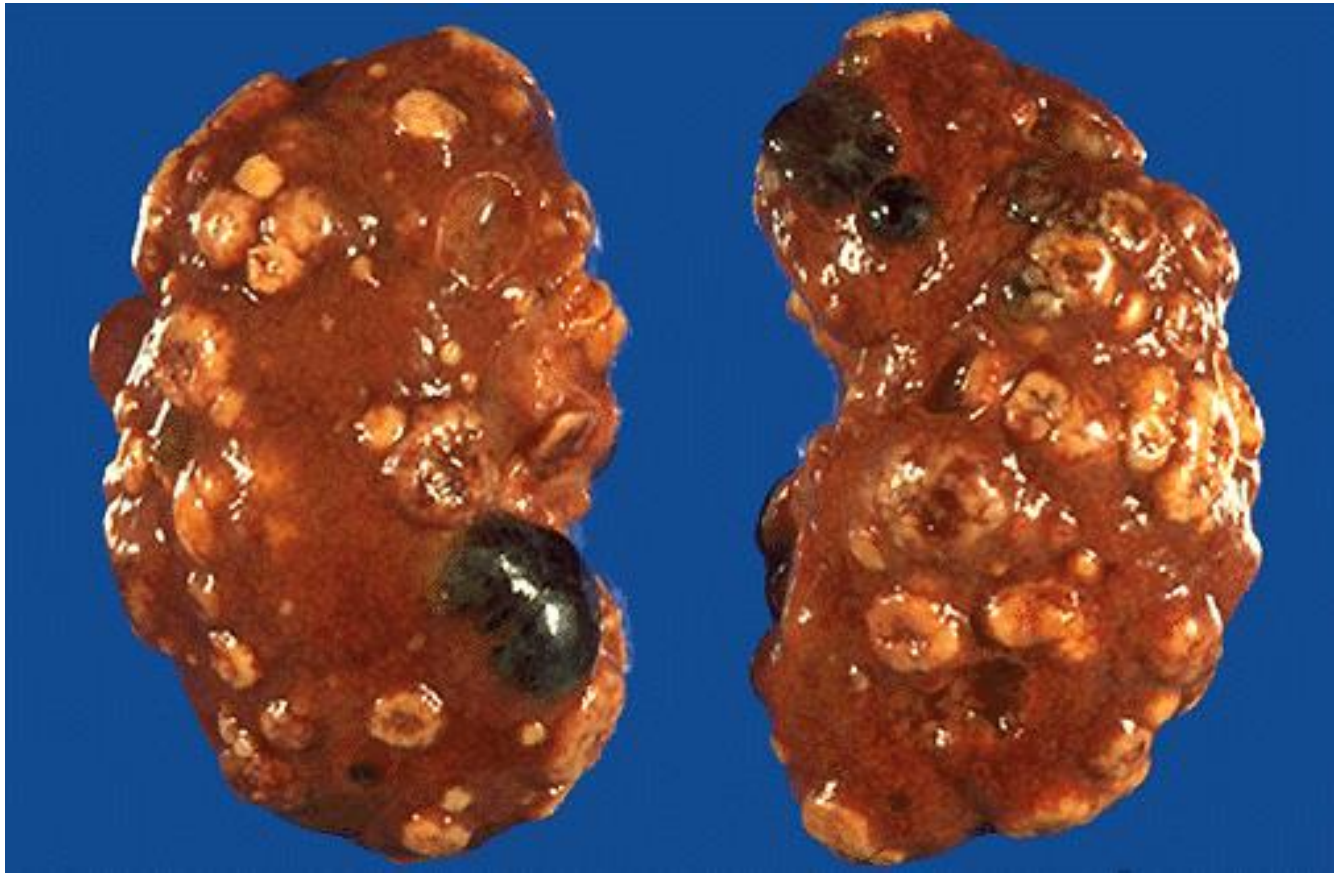
- These tumors produce a variety of hormone like substance resulting in (para neoplastic syndrome)
  - Feminization or masculinization
  - Hypercalsemia, hypertension
  - Cushing’ syndrome, amyloidsis
- Other symptoms and signs releated to metastasis in the lungs, bones and brain:
  - Dyspnea, hemoptysis
  - Pathological fracture
  - ↑ intra cranial pressure

- **<u>Staging:</u>**
  - T1: limited to kidney <2.5 cm
  - T2: limited to kidney > 2.5 cm
  - T3a: invades perinephric tissue or adrenal gland
  - T3b: invades renal vein of inferior venacava
  - T3c: extends to venacava above diaphragm
  - T4: invades beyond gerota fascia.

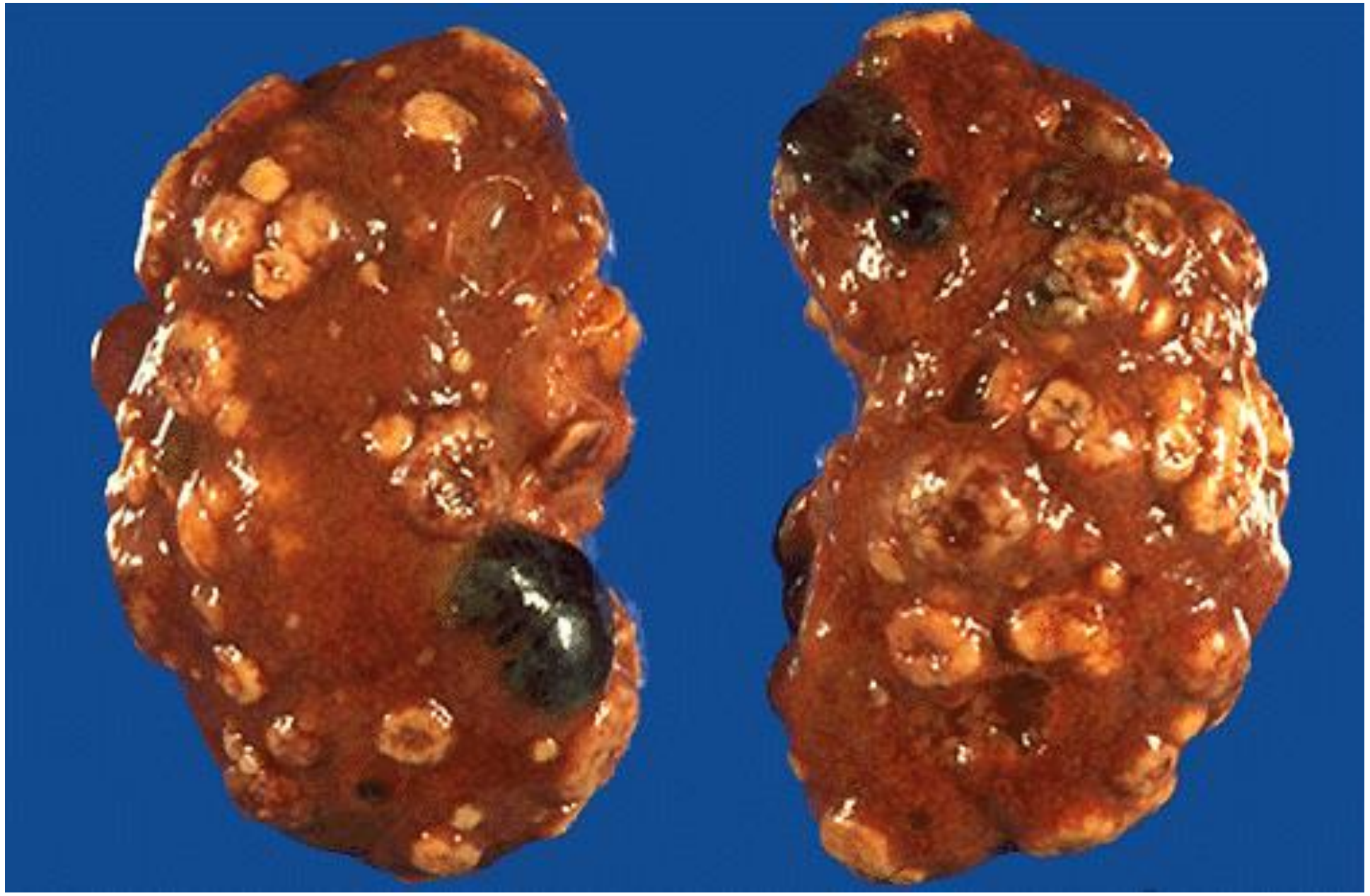
Secondary malignant tumor in the kidney:

- Kidney un usual site for metastasis
- Metastasis from the lung (bronchogenic carcinoma)
- Malignant melanoma
- choriocarcinoma

metastases of carcinoma to the kidneys



The multiple irregular bilateral masses (many of which show central indentations, or "umbilications", from necrosis) here represent metastases of carcinoma to the kidneys. Kidney is not a usual site for metastases.



Nephroblastoma

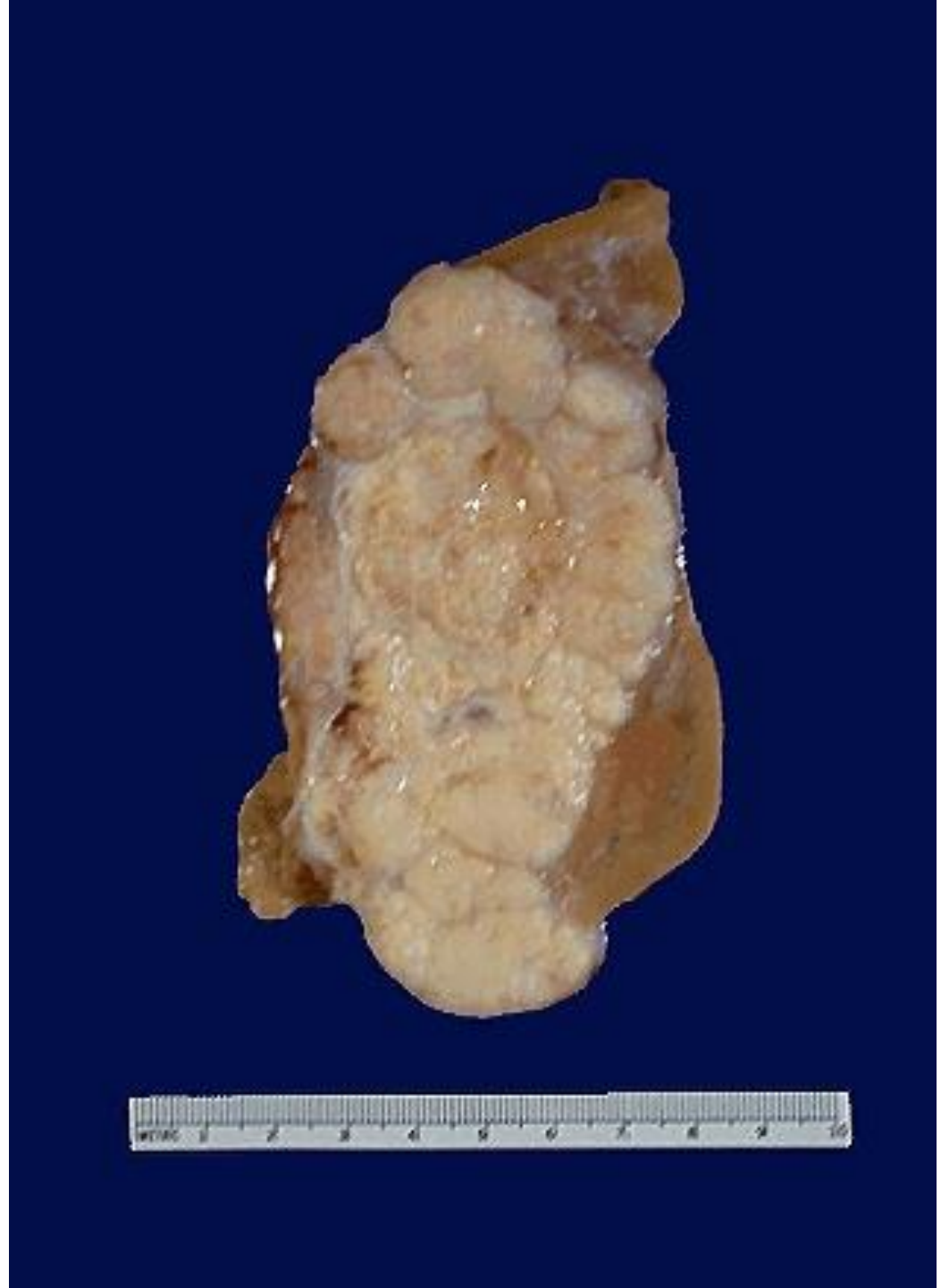
- This is an embryonic tumor derived from renal blastema
- Incidence: 13 – 20 % of childhood malignancies
- Age: below 15 years but most common from 3 -5 years of age
- Aetiology: one third of the tumors are hereditary, nephroblastoma with aniridia.WAGR_DDS abnormality of gene WT1-
- **<u>BWS Abnormality of gene WT2.</u>**

- **Gross:**
  - Bilateral in 6% of cases
  - Large sized mass
  - Non capsulated fleshy\grayish white cut section with area of hemorrhage, necrosis and cyst formation.

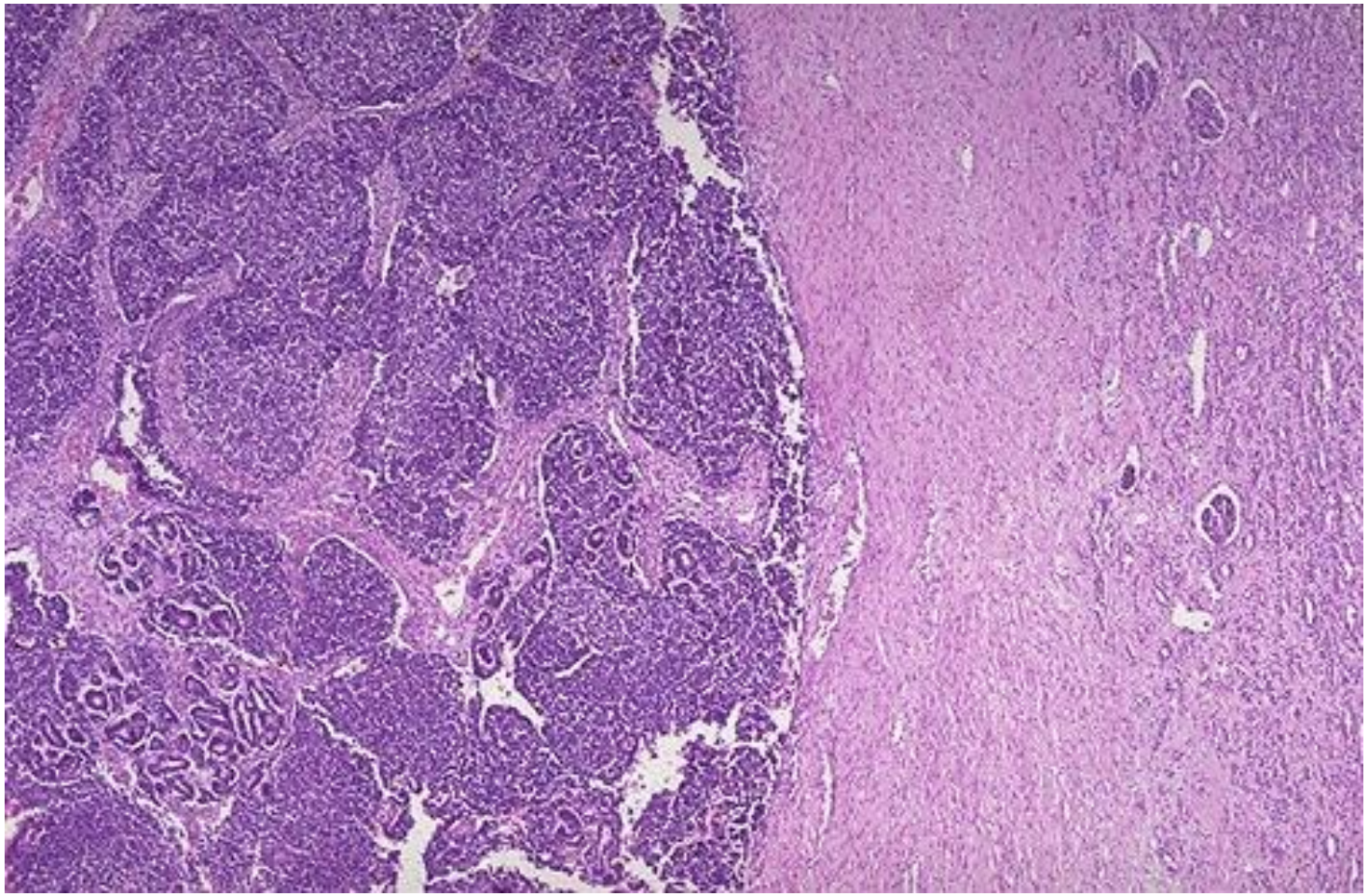
- **Microscopic:**
  - Aggregates of small undifferentiated blastemal cells.
  - Epithelial cells arranged in ribbons, primitive tubules or glmeruloid structure.
  - Mesenchymal elements either undifferentiated or show muscle or cartilaginous differentiation.

Wilms tumor

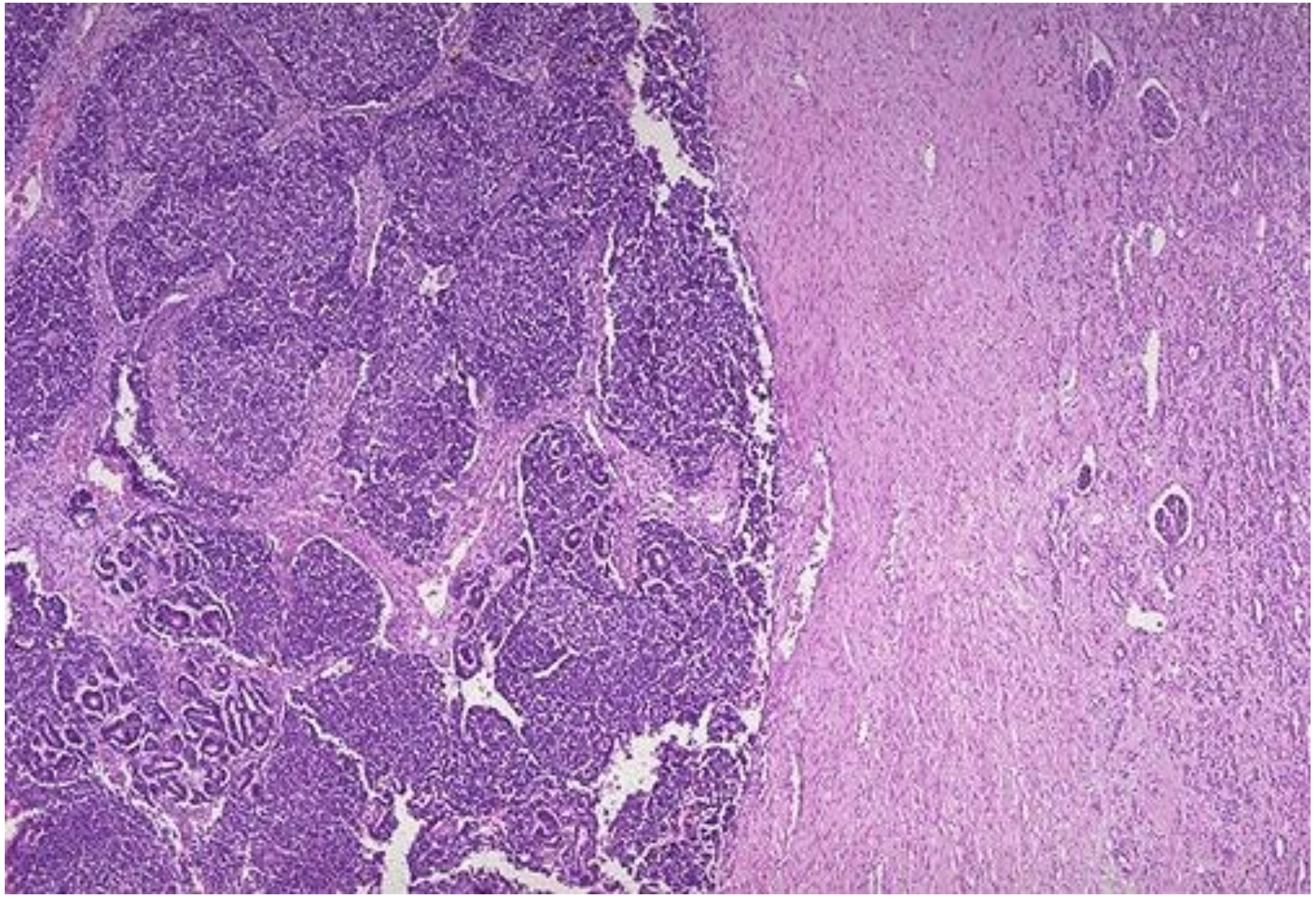
This small kidney from a 4 year old child contains a lobulated tan-white mass. This is Wilms tumor of the kidney. Many are now known to be associated with genetic defects on chromosome 11. The children with Wilms tumor usually present with abdominal enlargement from the mass effect. Nowadays, treatment gives a better than 90% 5 year survival.



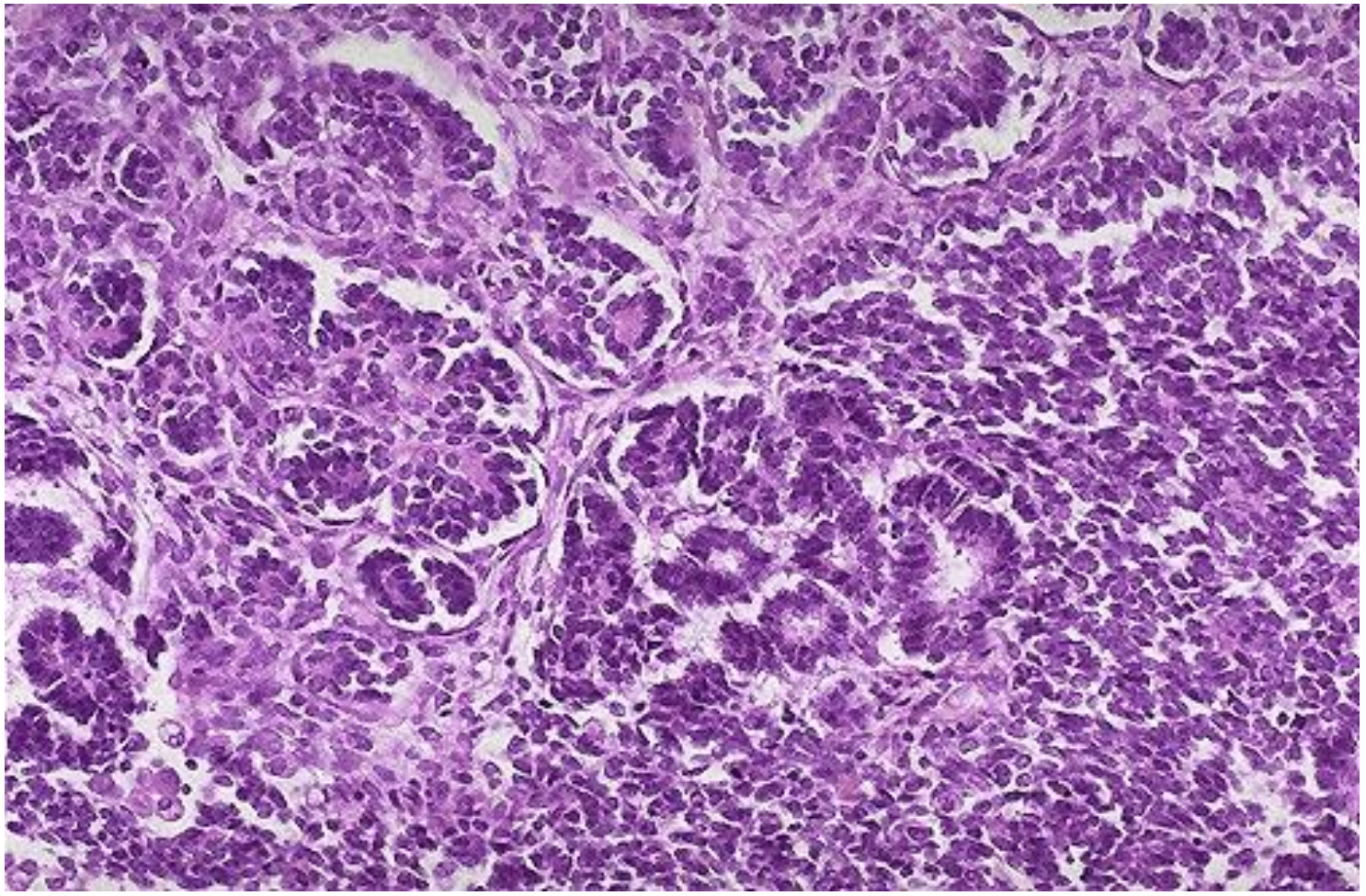
Wilms tumor



This is a Wilms tumor that is composed microscopically of nests and sheets of dark blue cells at the left with compressed normal renal parenchyma at the right.



Wilms tumor



Wilms tumor resembles the fetal nephrogenic zone of the kidney. The tumor shows attempts to form primitive glomerular and tubular structures